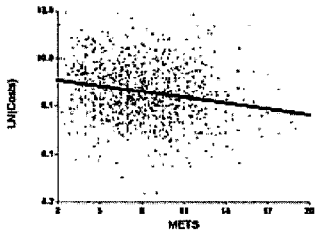
icant predictor of cost (F-statistic 21.8, P>0.001).
Conclusion: Our findings are consistent with the hypothesis that exercise capacity is inversely associated with age-adjusted health care costs.



1161-64 Exercise-Induced Expression of Angiogenic Cytokines in Normal and Infarcted Hearts

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The placebo effect seen in clinical angiogenesis and Laser myocardial revascularization studies was associated with significant improvements in symptoms, exertional capacity, and myocardial perfusion and function. The mechanisms of the physiological effects are not known. We hypothesized that patients do feel better, exercise more, and thus develop more collaterals and studied this in a mouse model.
Methods: In the first set of experiments we studied the effects of exercise on the expression of angiogenic cytokines and their receptors in normal mice. The exercise program consisted of 30 minutes of training regimens on a rodent treadmill followed by vigorous exercise at 15 m/min at a 50 degree incline for 90 minutes/day. C57/BL6 mice randomized to exercise or sedentary arms, and were sacrificed at day 0, 1,2,3,4,5,6,7 of exercise and hearts were excised and studied for the expression of VEGF, flk-1, and FGF-R-1 using Western and Northern analysis. In the second part of the experiment, 24 mice were randomized to four groups: myocardial infarction (ligation of left anterior descending artery) +/- exercise or sham surgery (thoracotomy) +/- exercise and were sacrificed after 2 and 7 days of exercise with assessment of myocardial salvage, collateral development by evans blue/TTC staining and histology, and expression of endothelial cell specific markers and angiogenic cytokines and receptors.
Results: 14 normal mice were used to study the time course of VEGF, flk-1 and FGF-R-1 expression in normal mice during exercise. There was a 4 fold increase in VEGF expression that peaked 24 hours after exercise and returned to baseline by day 5. FGFR-1 increased 5 folds and peaked at days 5-6. Myocardial infarction was associated with a marked increase in VEGF, flt-1, flk-1, and FGF-R1 as early as 24 hours after infarction.
Conclusion: Short-term exercise in mice is associated with increased expression of angiogenic cytokines and their receptors. Myocardial infarction is associated with a similar early increased expression. The effect of exercise on myocardial salvage may be related to its induction of angiogenesis.

1161-65 High Prevalence of Anxiety in Coronary Patients With Marked Improvements Following Cardiac Rehabilitation

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Background: Numerous studies indicate that psychological distress is a significant CAD risk factor, which adversely affects recovery following major CAD events. Although most studies focus on depression and hostility, acute and chronic anxiety also adversely affect cardiovascular risk.
Methods: Using the Kellner Symptom Questionnaire, a validated measure to assess various behavioral characteristics, and the MOS-SF 36 to assess quality of life (QoL), we studied 500 consecutive patients following major cardiac events to determine the prevalence of anxiety (symptom score > 7) and high anxiety (HA - score >10) and the response to formal phase II cardiac rehabilitation and exercise training programs in these patients.
Results: At baseline, the prevalence of anxiety was 27%, and 13% of the cohort had HA. Compared with 147 patients >/= 70 years (mean 74 +/- 4 years), 121 patients </= 55 years (mean 47 +/- 6 years) had a much higher prevalence of anxiety (44% vs. 24%; p<0.01). Compared with patients without anxiety, those with HA had significantly higher scores for depression (11.2 +/- 4.5 vs. 1.8 +/- 2.4 units; p<0.0001) and hostility (8.1 +/- 5.6 vs. 1.5 +/- 2.3 units; p<0.0001) and lower scores for QoL (82 +/- 17 vs. 103 +/- 17 units; p<0.0001). Following cardiac rehabilitation, patients with HA had significant improvements in obesity indices (weight-3%, p=0.02; % fat -7%, p<0.01; BMI-3%, p=0.02), exercise capacity (+44%, p<0.0001), HDL (+6%, p=0.02), TC/HDL (-7%, p<0.05), and behavioral scores (anxiety -56%, depression -60%, somatization -43%, and hostility -49%; all p < 0.0001). In addition, improvements in QoL (p<0.0001) were more marked in patients with HA (+28% vs. +14%, p<0.01) compared with non-anxious patients.
Conclusion: These data indicate the very high prevalence of anxiety and moderate-severe anxiety in patients with CAD, particularly in the younger patients, and the marked improvement in overall CAD risk profile noted in these patients following formal cardiac rehabilitation and exercise training. Greater attention at detecting and treating chronic anxiety is needed in the secondary prevention of CAD.

1161-66 Assessment of Left Ventricular Diastolic Function Following Completion of a Marathon in a Group of Well-Trained Runners

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Background: Previous studies have demonstrated diastolic dysfunction following ultraendurance exercise. However, there is limited data about diastolic function after a shorter endurance event such as a marathon.
Methods: We examined 45 patients (26 men, 19 women; mean age= 35 ± 8.1 years) who successfully completed the 2001 Chicago Marathon (26.2 miles). Transthoracic echocardiograms (TTE) were performed approximately two weeks before the marathon (17 ± 10.7 days), immediately following the marathon (71 ± 42.0 minutes), and four weeks following the marathon (29 ± 12.9 days). Diastolic echo parameters included Isovolumic Relaxation Time (IVRT), Deceleration Time (DT), and E/A ratio.
Results: n=45 patients with a mean marathon completion time of 4 ± 0.7 hours. See table.

TTE	Baseline	Immediate Post	Follow-Up
IVRT (ms)	115 ± 26.0	85 ± 19.9 *	111 ± 33.1
E/A ratio	2 ± 0.6	1 ± 0.4 *	2 ± 0.5
Decel Time (ms)	260 ± 68.5	202 ± 43.4 *	234 ± 52.1
Systolic BP	117 ± 14.9	115 ± 14.1	116 ± 13.0
Diastolic BP	68 ± 9.9	72 ± 9.6	68 ± 10.8
Heart Rate	60 ± 25.9	78 ± 11.7 *	59 ± 12.7

* p<0.05 *vs.* Baseline and Follow-Up

Conclusions: A decrease in IVRT, Deceleration Time, and E/A ratio immediately following completion of the marathon likely reflects a reduced volume status and/or increased heart rate rather than altered compliance. All Doppler parameters returned to baseline at one month follow-up, suggesting that completion of an endurance event such as a marathon does not result in impairment of left ventricular diastolic function.

1161-67 The Effect of Exercise Training on the Endothelial Function of Coronary Artery in Patients With Myocardial Infarction

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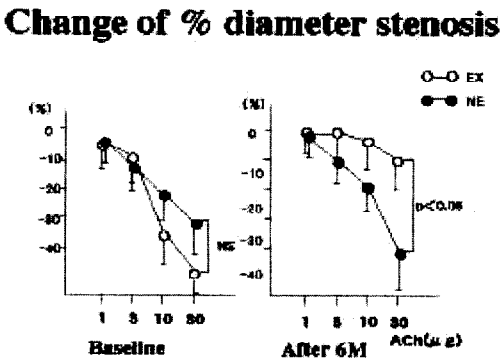
Background: Exercise training improves the endothelial function of arteries in skeletal muscle, but few studies have examined the clinical effect of exercise training on coronary endothelial function. This study investigated whether regular exercise improves endothelial function in human coronary arteries. Method: Non-infarct-related coronary arteries in 41 patients with recent myocardial infarction who underwent successful percutaneous transliminal coronary angioplasty were studied. Patients were divided into two groups: regular exercisers (EX;n=24, 17 males, mean age; 58 years), non-exercisers (NE:n=17, 12 males, mean age: 58 years). We infused acetylcholine into the non-infarct-related coronary artery and measured the diameter by quantitative angiography at baseline and 6 months after angioplasty. Results: Acetylcholine (Ach), given in doses of 1, 3, 10, 30μg per minute, increased the coronary artery diameter in a dose-dependent manner in both groups. The mean percent change in the diameter at the site of stenosis change (%DS) was less in the regular exercisers than in the non-exercisers (11%±12 vs. 41%±36,p<0.05) . Multivariate analysis showed that regular exercise was an only significant determinant of improvement in endothelial function (p=0.01). Conclusion: These findings suggest that regular exercise improves endothelial function in the coronary arteries following with myocardial infarction.



Cardiac Function and Heart Failure